

## **Golf club head and method of securing a weight adjustment member to a golf club head**

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### **Abstract**

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A method of securing a weight adjustment member within a golf club head cavity comprises irradiating an ultraviolet curable adhesive with ultraviolet radiation and affixing the weight adjustment member to the club head. In one embodiment the ultraviolet curable adhesive is a film member applied to multiple surfaces of a weight adjustment member. The weight adjustment member is then inserted into the cavity such that the film member contacts a cavity surface in the golf club head. The film member is then allowed a predetermined amount of time in which to cure, thereby securing the weight adjustment member to the golf club head.

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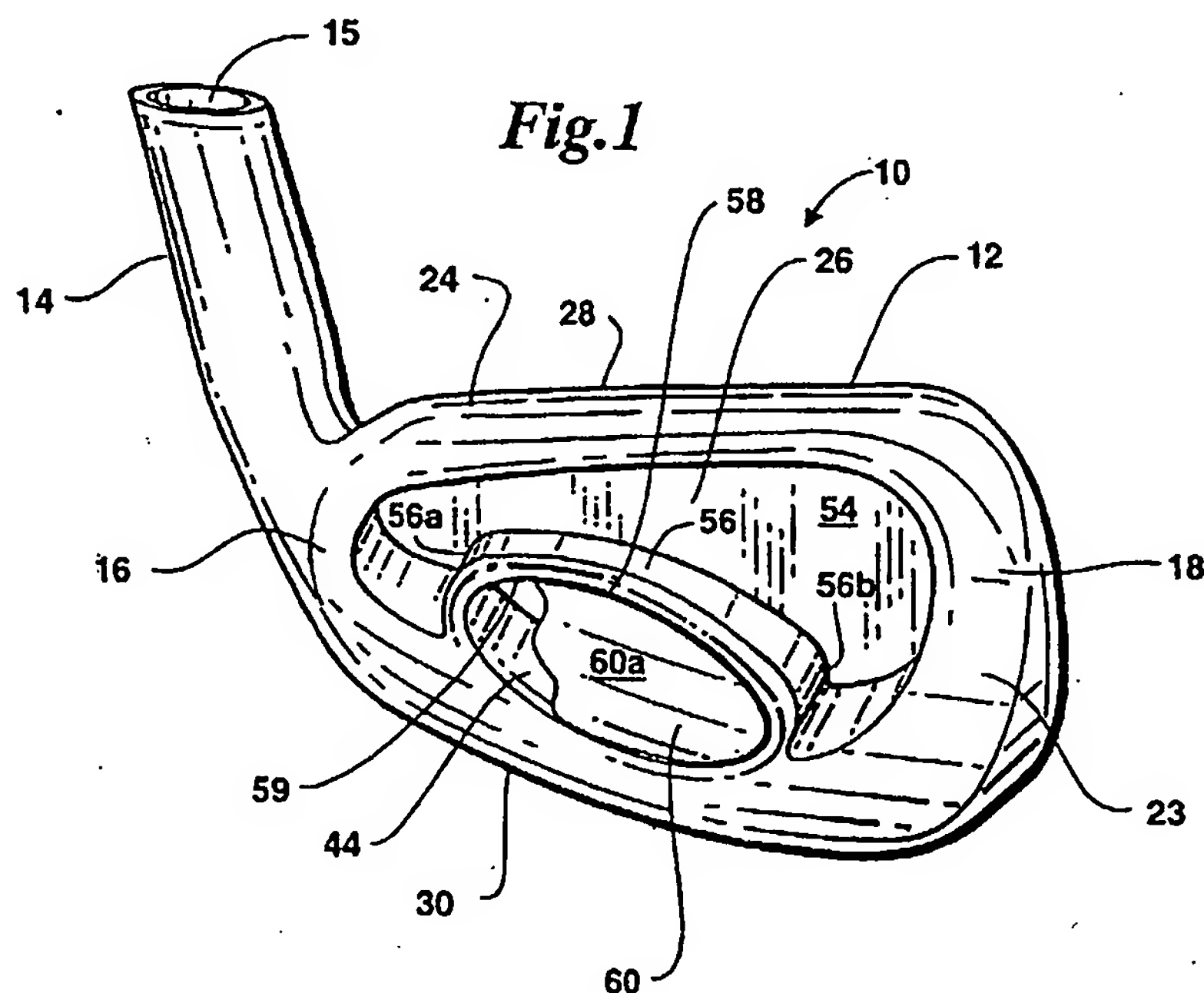
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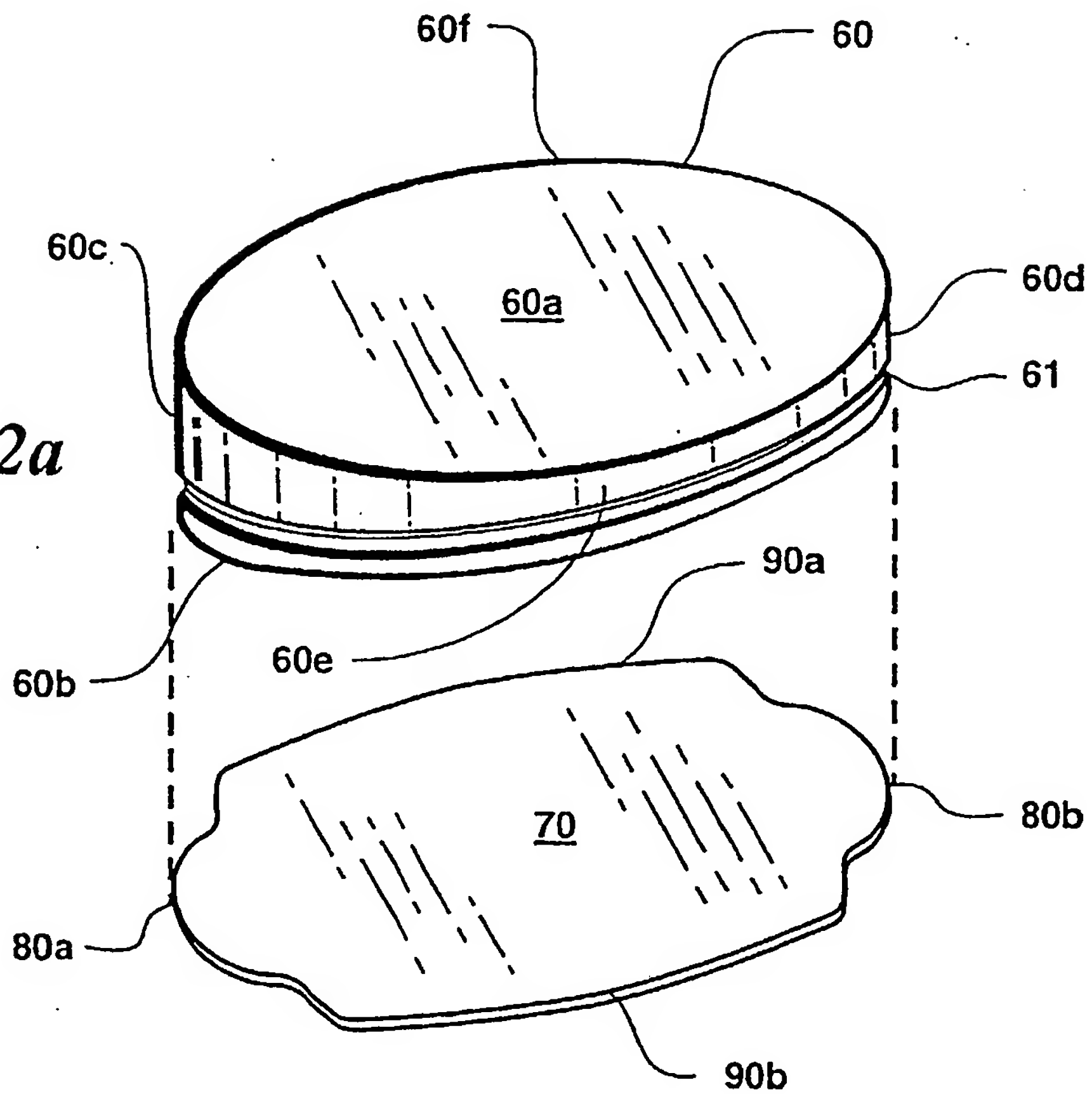
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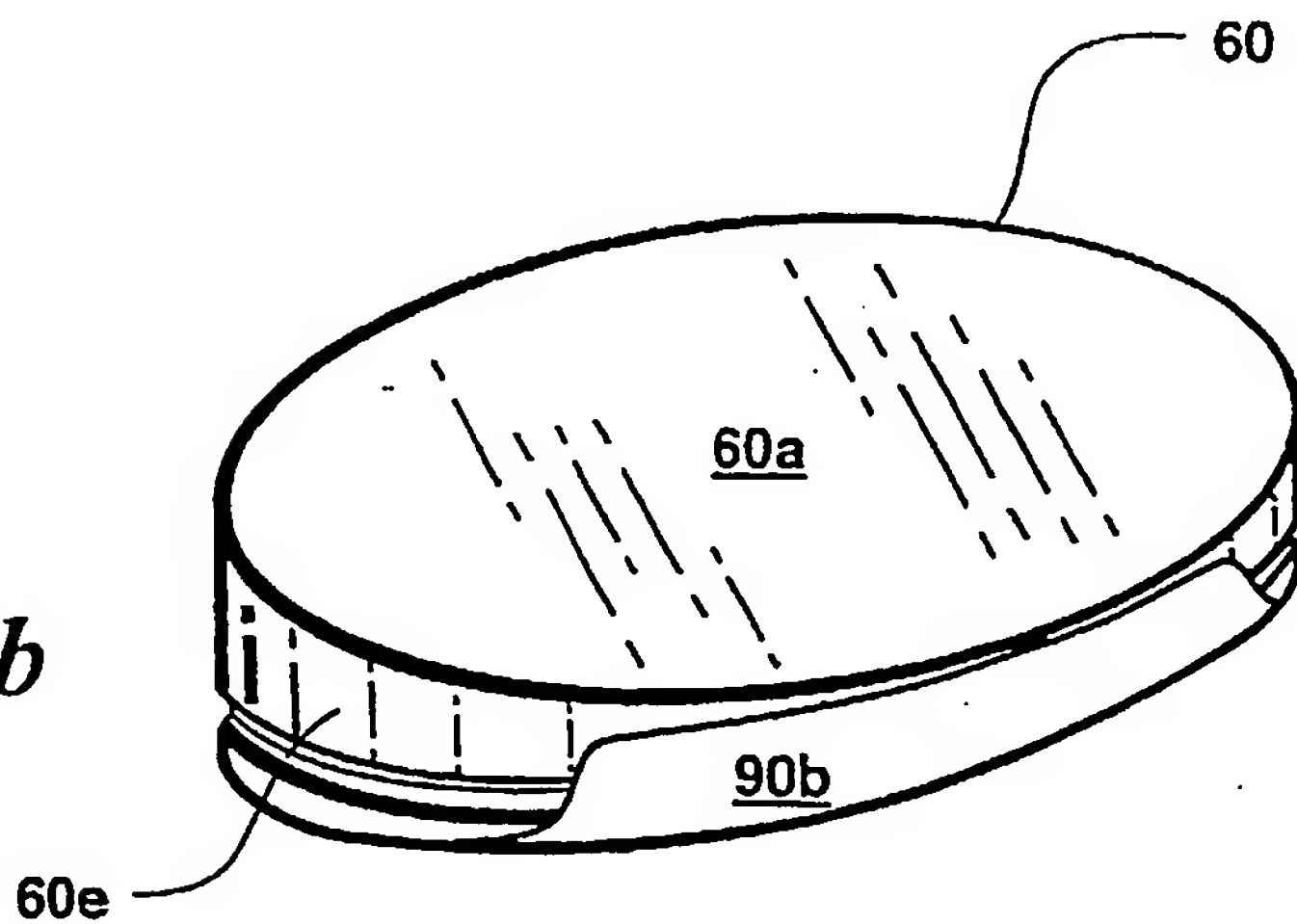
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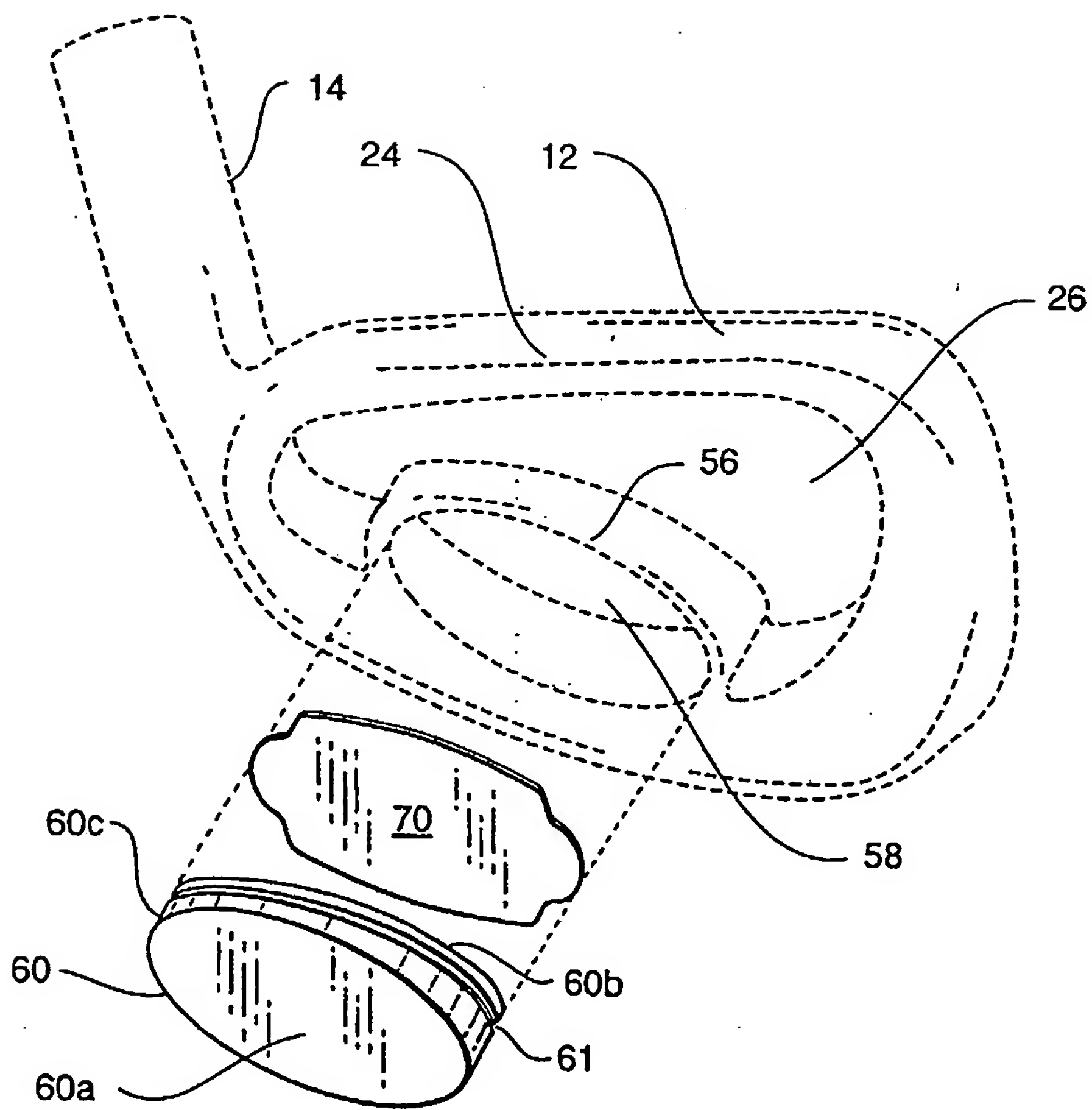
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*Fig. 2a*



*Fig. 2b*





**Fig.3**

**2365785**

**GOLF CLUB HEAD AND METHOD OF SECURING A WEIGHT  
ADJUSTMENT MEMBER TO A GOLF CLUB HEAD**

This invention relates generally to golf equipment and, in particular, to a golf club head and a method of securing a weight adjustment member to a golf club head.

Golf clubs have incorporated weighting members, usually installed in the club head for enabling adjustment of the swing weight of a particular golf club as desired. Such a golf club is described in pending U.S. Patent Application Serial No. 09/346,287 to Daniel J. Kubica et al, which is assigned to the assignee of the present application and is incorporated herein by reference. Ordinarily, these weighting members are affixed to the golf club head by epoxy.

The use of epoxy in such manner, however, presents several problems, several of which stem from the fact that epoxy is difficult to handle and dispense. Also among the problems with epoxy is its relatively slow curing time. For example, a golf club manufacturer employing epoxy to secure a weighting member to a golf club head must allow sufficient curing time (about 24 hours) before the golf club can be shipped. If the golf club is shipped prior to full curing, the weighting member may become dislodged from the club head and the golf club will arrive at its destination in a defective form. Accordingly, what is needed is an improved means of securing a weighting member to a golf club head that is more suitable to high-volume production and that does not include the disadvantages associated with the use of epoxy.

In a first aspect the present invention provides a method of securing a weight adjustment member within a golf club head cavity comprises irradiating an ultraviolet curable adhesive film with ultraviolet radiation for securing the weight adjustment member to the golf club head. In one embodiment, the ultraviolet adhesive is a film member applied to multiple surfaces of a weight adjustment member. The weight adjustment member is then inserted into the club head cavity such that the film member contacts a cavity surface. The film member is then allowed to cure for a predetermined amount of time, thereby securing the weight adjustment member to the golf club head.

#### **DESCRIPTION OF THE DRAWINGS**

Fig. 1 is a perspective view of an iron type golf club head constructed according to principles of the present invention;

Fig. 2a is an exploded view of a weight adjustment member and a corresponding film member according to the present invention;

Fig. 2b is a perspective view of a weight adjustment member and a film member applied thereto according to the present invention; and

Fig. 3 is an exploded view of the golf club head of Fig. 1.

#### **DESCRIPTION OF THE PREFERRED EMBODIMENT**

Referring to Figs. 1 and 3, an iron-type golf club head 10 includes a body 12 and a hosel 14 containing a cylindrical bore 15 for receiving one end of a golf club shaft (not shown). Although the club head 10 is shown as an iron-type club head, club head 10

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#### **DESCRIPTION OF THE PREFERRED EMBODIMENT**

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could also be a wood-type club head, a putter-type club head, or any other club head for which adjustment of swing weight may be desired. The body 12 has a heel portion 16 and a toe portion 18 that are spaced apart. A back face 23 is provided on the body 12 and extends between the body heel and toe portions 16, 18.

A perimeter weighting element 24 protrudes rearwardly from a front face (not shown) of body 12 and defines a primary cavity 26 in the back face 23. The perimeter weighting element 24 includes a top rail 28 and a sole 30. The primary cavity 26 is defined at its upper extremity by the top rail 28 and at its lower extremity by the sole 30. The primary cavity 26 defined by the perimeter weighting element 24 has a bottom surface 54. Formed integrally on the primary cavity bottom surface 54 is an interior wall 56 that extends from a first end 56a located adjacent the body heel portion 16 through the primary cavity 26 between the top rail 28 and the sole 30 to a second end 56b located adjacent the body toe portion 18.

The first and second ends 56a, 56b of the interior wall 56 are integrally connected to the perimeter weighting element 24 adjacent the body heel and toe portions 16, 18 defining a secondary cavity 58 in the back face 23 within the primary cavity 26. The inner surface 44 of the perimeter weighting element 24 is disposed between the first and second ends 56a, 56b of the interior wall 56 and forms a lower extremity of the secondary cavity 58. An inner surface 59 of the interior wall 56 forms an upper extremity of the secondary cavity 58.

As best shown in Fig. 2a, a weight adjustment member 60 has a top surface 60a, a bottom surface 60b, side surfaces 60e, 60f and end surfaces 60c, 60d extending between the top and bottom surfaces 60a, 60b. A groove 61 formed in the side surfaces 60e, 60f

and end surfaces 60c, 60d extends peripherally of the weight adjustment member 60.

Fig. 2a further illustrates an adhesive film member 70 comprised of an ultraviolet curable adhesive such as 3M® NPE-BSD64. Film member 70 comprises two lobes 80a, 80b and two flaps 90a, 90b. Prior to curing, film member 70 is soft and pliable.

To initiate the method of the present invention, film member 70 is irradiated for a period of approximately four minutes with long wavelength ultraviolet radiation, such as is provided by a conventional blacklight. Alternatively, short wavelength ultraviolet radiation may be used to significantly decrease the amount of necessary irradiation time. Preferably, film member 70 is manually positioned to be irradiated by the ultraviolet radiation source.

Once film member 70 has been irradiated as described above, film member 70 is manually applied to the bottom surface 60b of the weight adjustment member 60. The film member flaps 90a, 90b substantially conform to the side surfaces 60e, 60f of the weight adjustment member 60 as shown in Fig. 2b. Film member 70 may be configured, e.g. by die cutting in the uncured state, to vary the size and geometric configuration of lobes 80a, 80b and flaps 90a, 90b so as to accommodate varying configurations of the weight adjustment member 60. This combination of weight adjustment member 60 and film member 70 is then inserted into secondary cavity 58 of the club head 10 such that film member 70 contacts inner surface 44, inner surface 59 and that portion of bottom surface 54 bounded by interior wall 56. Groove 61 receives portions of flaps 90a, 90b so as to prevent any portion of film member 70 from being pushed out of secondary cavity 58.

If no secondary cure is initiated, weight adjustment member 60 is sufficiently secured to golf club head 10 such that club head 10 may be used to play golf in customary fashion after a period of approximately 24 hours of curing time. In order to substantially reduce this 24 hour curing period, film member 70 may be induction cured by exposing the assembled combination of golf club head 10, weight adjustment member 60 and film member 70 to air heated to approximately 170 degrees Fahrenheit for at least six seconds. Such induction curing reduces the curing time of film member 70 to approximately 15 minutes, at which time club head 10 may be used to play golf in customary fashion.

Although the invention has been described in terms of the illustrative embodiment, it will be appreciated by those skilled in the art that various changes and modifications may be made to the illustrative embodiment without departing from the spirit or scope of the invention. For example, film member 70 may be positioned by an automated process to be irradiated by the ultraviolet radiation source. Similarly, film member 70 may be applied to weight adjustment member 60 by an automated process. It is intended that the scope of the invention not be limited in any way to the illustrative embodiment shown and described but that the invention be limited only by the claims appended hereto.

What is claimed is:

1. A method of securing a weight adjustment member to a golf club having a head, the method comprising the steps of:  
  
    irradiating an ultraviolet curable adhesive with ultraviolet radiation;  
  
    applying said ultraviolet curable adhesive to a surface of the weight adjustment member; and  
  
    positioning the weight adjustment member on the golf club head such that said ultraviolet curable adhesive contacts the golf club head.
2. The method of claim 1, further comprising the step of induction curing said ultraviolet curable adhesive.
3. The method of claim 1, further comprising the step of forming said ultraviolet curable adhesive into a film member.
4. The method of claim 3, wherein said forming step further comprises forming at least one flap on said film member.
5. The method of claim 1, wherein said positioning step comprises inserting the weight adjustment member into a cavity formed in the golf club head.
6. The method of claim 1, wherein said ultraviolet curable adhesive comprises 3M® NPE-BSD64 film.

7. The method of claim 1, wherein said irradiating step is performed manually.
8. The method of claim 1, wherein said irradiating step is performed by an automated process.
9. The method of claim 1, wherein said applying step is performed manually.
10. The method of claim 1, wherein said applying step is performed by an automated process.
11. A method of securing a weight adjustment member within a cavity in a golf club head, the cavity defined by at least one surface formed on the golf club head, the method comprising the steps of:
  - irradiating an ultraviolet curable adhesive with ultraviolet radiation;
  - applying said ultraviolet curable adhesive to a surface of the weight adjustment member; and
  - inserting the weight adjustment member into the cavity such that said ultraviolet curable adhesive contacts said at least one surface.
12. The method of claim 1, further comprising the step of induction curing said ultraviolet curable adhesive.

13. The method of claim 1, further comprising the step of die cutting said ultraviolet curable adhesive into a film member.

14. The method of claim 13, wherein said die cutting step further comprises forming at least one flap on said film member.

15. The method of claim 1, wherein said ultraviolet curable adhesive comprises a film member.

16. A golf club head comprising:  
a body with a back face;  
a cavity formed in said back face;  
a weight adjustment member disposed within said cavity; and  
a film member for securing said weight adjustment member in said cavity, said film member being an ultraviolet curable adhesive.

17. The golf club head of claim 16, wherein said film member comprises a flap for conforming to a side surface of said weight adjustment member.